

WHAT IS CLAIMED IS:

1. A camera support comprising:
 - a pan frame, including a pan housing, a pan arm, rotatably attached to the pan housing and a pan motor for moving the pan arm relative to the pan housing;
 - a tilt frame including tilt housing, a tilt arm rotatably attached to the tilt housing and a tilt motor for moving the tilt arm relative to the tilt housing, and with the tilt frame securable onto the pan arm at multiple positions along the pan arm; and
 10. a roll frame having a roll housing and a camera platform rotatably attached to the roll housing, and a roll motor for moving the camera platform relative to the roll housing, and with the roll frame securable to the tilt arm at multiple positions along the tilt arm.
2. The camera support of claim 1 with the tilt frame slidably attached to the pan frame, and including a locking element movable into an open position, to allow sliding movement between the pan frame and the tilt frame, for adjusting the relative position of the tilt frame to the pan frame, and with the

locking element also moveable into a locked position, to lock the tilt frame into a fixed position on the pan frame.

3. The camera support of claim 1 further comprising a worm gear on the pan motor meshing with a drive gear linked to the pan through a clutch.

5 4. The camera support of claim 1 further comprising a slip ring assembly in each of the pan, tilt and roll housings, and with water proof cable segments extending between the slip ring assemblies.

5. The camera support of claim 1 further comprising a sealed bearing in the pan housing, providing a low friction rotation connection
10 between the pan arm and the pan housing.

6. The camera support of claim 1 further comprising a first pair of waterproof connectors between the pan housing and the tilt housing, a second pair of waterproof connectors between the tilt housing and the roll housing, and a third pair of waterproof connectors on the camera platform.

15 7. The camera support of claim 1 further comprising gas purge ports in the tilt housing.

8. The camera support of claim 1 further comprising a pan lock pin moveable between a lock position where the pan lock pin extends between the pan housing and the pan arm, to prevent movement between them, to an unlock position wherein the pan lock pin is withdrawn from one of the pan housing and the pan arm, to allow rotational movement between them.

9. The camera support of claim 1 further comprising an adjustable pan brake to set pan axis braking force.

10. The camera support of claim 1 further comprising a pan shaft in the pan housing, with the pan motor connecting to the pan shaft via gearing, and with the pan shaft sealed against the pan housing and rotatable within the pan housing when driven by the pan motor.

11. The camera support of claim 1 further comprising seals in the pan housing, the tilt housing and the roll housing, for sealing water out of each of the housings, to allow for underwater operation of the camera support.

15 12. A camera head comprising:

a first frame;

a first arm rotatably attached to the first frame;

a first motor for rotating the first arm relative to the first frame,
with the first motor enclosed within a sealed first housing;

a second frame attached to the first arm;

a second arm rotatably attached to the second frame; and

5 a second motor for rotating the second arm relative to the second
frame, with the second motor enclosed within a sealed second housing.

13. The camera head of claim 12 further comprising a third frame, a
third arm rotatably attached to the third frame, and a third motor for rotating
the third arm relative to the third frame, with the third motor enclosed within a
10 sealed third housing.

14. The camera head of claim 12 wherein the first and second sealed
housings are waterproof, to allow for underwater operation of the camera
head.

15. The camera head of claim 12 further comprising a first shaft
rotatably supported within the first housing, with the second frame attached to
the first shaft, and the first shaft sealed against the first housing, a first gear
linked to the first shaft through a first clutch, and with the first gear linked to

the first motor, and at least one clutch operation lever on the housing moveable from a first position, wherein the lever engages the first clutch to allow the first motor to drive the first shaft, to a second position, wherein the lever disengages the first clutch, allowing the first shaft to rotate free of the
5 motor.

16. The camera head of claim 15 further comprising one or more clutch drive pins within the first housing between the first clutch and the clutch operation lever, and with the clutch drive pins axially moveable within the first housing and sealed against the first housing.

10 17. The camera head of claim 12 further comprising:

a first housing on the first frame;
a first hollow shaft rotatably supported within the first housing, with the second frame attached to the first shaft, and the first shaft sealed against the first housing;

15 a first gear linked to the first shaft through a first clutch, and with the first gear linked to the first motor;

a first slip ring assembly extending into the first hollow shaft;

a first shaft plug within and sealed against the first hollow shaft;

a first electrical cable extending into a first end of the first slip ring assembly via a waterproof connection; and

5 a second electrical cable extending through a waterproof connection in the first shaft plug and into a second end of the first slip ring assembly.

18. The camera head of claim 17 further comprising a tube adapter having a tube nipple and a base plate, with the tube adapter attached to the first slip ring assembly and to the first housing, first seal sealing the base plate 10 to the first slip ring assembly, and a second seal sealing the slip ring assembly to the first housing, to provide a waterproof connection for wires leading into the first slip ring assembly.

19. The camera head of claim 12 further comprising a position locking device moveable from a locked position, wherein the locking device prevents 15 movement between the first arm and the second housing, to an unlocked position, wherein the second housing can move relative to the first arm, to adjust the size of the camera head.

20. A camera support comprising:

- a first frame including a first housing;
 - a first shaft rotatably supported within the first housing, and sealed against the first housing;
 - a first arm attached to the first shaft;
- 5 a first motor sealed within the first housing, for rotating the first shaft, to rotate the first arm relative to the first housing;
- a second frame including a second housing;
 - a second shaft rotatably supported within the second housing, and sealed against the second housing;
- 10 a second arm attached to the second shaft;
- a second motor sealed within the second housing, for rotating the second shaft, to rotate the second arm relative to the second housing;
 - and with the second frame having an extension section slidable over or into the first arm;
- 15 and a locking device associated the extension section and the first arm, with the locking device movable from a locked position, wherein the

locking device locks the extension section and the first arm together, to an unlocked position, wherein the extension section can slide over or into the first arm, to adjust the size of the camera support.

21. The camera support of claim 20 further comprising a third frame
5 having a third housing and a camera platform rotatably attached to the third housing, and a third motor for moving the camera platform relative to the third housing, and with the roll frame securable to the second arm at multiple positions along the second arm.

22. The camera support of claim 20 wherein the locking device
10 comprises a cam lever.